APOLLO

First Post-war Civil Aircraft by Sir W. G. Armstrong Whitworth Ltd.

APOLLO, of all the deities in Greek mythology, was perhaps the most important and many-sided of the dwellers on Parnassus. But it is as the god of colonization, taking emigrants on their voyages, that his name is most aptly given to the new Armstrong Whitworth inter-capital passenger transport, the AW 55. One can also find a link in classic mythology for the Armstrong Siddeley Mamba airscrew turbines which are used to power the Apollo, for among the *fauna* sacred to him is the snake, this connection having a prophetic context which we may hope will be apt to the aircraft's future.

Designed to meet the recommendations of the Brabazon Committee's Type II B classification, the standard version of the Apollo provides a medium-stage, general-purpose transport aircraft for the accommodation of 24 to 31 passengers plus baggage and freight, making a total payload of 7,500 lb. Thus the bare bones of the category. However, technological advances and orthodox practice are sensibly blended in the Apollo design to furnish an aircraft of quite conventional general appearance and layout, but with (i) turboprop power units, (ii) fuselage pressurization and full cabin atmosphere control, and (iii) an advanced form of wing structure giving high torsional rigidity. Additional, but perhaps secondary, refinements are included in the use of thermal de-icing, Fowler flaps and (although not to be fitted to the prototype) a two-part servo rudder.

Although the general layout of the aircraft conforms to the orthodox concept of a modern low-wing design, the use of turboprops and Fowler flaps called forth some measure of design ingenuity in the main undercarriage geometry and flap actuation. The small diameter of the Mamba power units makes it impossible to retract the undercarriage into the nacelles in the time-honoured fashion, quite apart from the intransigence of the jet pipe. Additionally, the moderately thin wing also affords little stowage space for wheels and legs of the size required. The only alternative was to retract sideways in the fighter manner. Unfortunately, the spanwise location of the undercarriage legs when retracted meant that straightforward support and actuation of the Fowler flaps was obstructed, and in order to overcome this, a system was devised using swinging links for flap articulation.

There is nothing very unusual in the detail design of the fuselage, although the use of alternating wide and narrow frames is not standard practice. The frames are alike in being of rolled channel-section form but, whereas the narrow channels ride on the free flanges of the Z-section stringers, the wide channels are notched for stringer passage, attachment between stringers and frames being by direct riveting and through the medium of shear cleats. Built in three sections, with transport joints formed by abutting extruded rings bolted through their free flanges, the fuselage is of circular section almost throughout and, longitudinally, incorporates a parallel trunk 10ft 2 in in diameter and about 18ft in length.

To bridge the cut-out in the belly of the fuselage necessitated by having to accommodate the undercarriage and centre-section flap, resort has been made to massive extruded longerons at floor level to compensate the loss in rigidity under bending load caused by the cut-out. Throughout the cabin the floor is at one level, but forward of the bulkhead dividing the flight deck from the rearward accommodation, the floor is raised about 4in above the general level. Lateral channel-section beams are used, together with Z-section intercostals, to form a grid framework supporting the floor panelling, the floor as a whole being stressed to cope with a loading of 50 lb/sq ft.

At the main- and front-spar stations, wing/fuselage union is made through massive fork-and-lug forgings, the fuselage units of which are so designed as to form integral parts of the massive built-up frames at these stations. The front spar-frame is of I-section, whilst the main spar-frame is of box form, both frames employing heavy-gauge extruded L-section "booms" and plate webs and flanges. For a pressure differential of 5½ lb/sq in, the window area is generous (about 18in by 15in) whilst the method of glazing is as clever as it is novel. Dry air sandwich-type windows are used, the outer panes being approximately ⅛in Perspex whilst the inner panes are about ⅛in thick with a ⅜in-wide cavity between. The panes are carried in double-channel frames of extruded rubber which are clamped securely in position by diagonal drawbolts; two windows on each side are formed as escape hatches.

Like the structural framing of the windows, that to the doors is also built-up with press-formed members although, naturally, of heavier gauge. Another example of fresh-